

What is claimed is:

1. A method for identifying a compound as a candidate for a herbicide, comprising:
 - a) contacting a BS with a compound; and
 - b) detecting the presence and/or absence of binding between the compound and the BS, wherein binding indicates that the compound is a candidate for a herbicide.
2. The method of claim 1, wherein the BS is a plant BS.
3. The method of claim 2, wherein the BS is an *Arabidopsis* BS.
4. The method of claim 3, wherein the BS is SEQ ID. NO. 2.
5. A method for determining whether a compound identified as a herbicide candidate by the method of claim 1 has herbicidal activity, comprising: contacting a plant or plant cells with the herbicide candidate and detecting the presence or absence of a decrease in growth or viability of the plant or plant cells.
6. A method for identifying a compound as a candidate for a herbicide, comprising:
 - a) contacting a compound with at least one polypeptide selected from the group consisting of: an amino acid sequence comprising at least ten consecutive amino acids of a plant AS, an amino acid sequence having at least 85% sequence identity with a plant BS, and an amino acid sequence having at least 80% sequence identity with a plant BS and at least 50% of the activity thereof; and
 - b) detecting the presence and/or absence of binding between the compound and the polypeptide, wherein binding indicates that the compound is a candidate for a herbicide.
7. A method for determining whether a compound identified as a herbicide candidate by the method of claim 6 has herbicidal activity, comprising: contacting a

plant or plant cells with the herbicide candidate and detecting the presence or absence of a decrease in growth or viability of the plant or plant cells.

8. A method for identifying a compound as a candidate for a herbicide, comprising:

- a) contacting a dethiobiotin and a sulfur donor with BS;
- b) contacting the dethiobiotin and a sulfur donor with BS and the candidate compound; and
- c) determining the concentration of at least one of dethiobiotin, a sulfur donor, and/or biotin after the contacting of steps (a) and (b).

9. The method of claim 8, wherein the BS is a plant BS.

10. The method of claim 9, wherein the BS is an *Arabidopsis* BS.

11. The method of claim 10, wherein the BS is SEQ ID. NO. 2.

12. A method for identifying a compound as a candidate for a herbicide, comprising:

- a) contacting dethiobiotin and a sulfur donor with a polypeptide selected from the group consisting of: a polypeptide having at least 85% sequence identity with a plant BS, a polypeptide having at least 80% sequence identity with a plant BS and at least 50% of the activity thereof, and a polypeptide comprising at least 100 consecutive amino acids of a plant BS;
- b) contacting the dethiobiotin and a sulfur donor with the polypeptide and the compound; and
- c) determining the concentration of at least one of dethiobiotin, a sulfur donor, and/or biotin after the contacting of steps (a) and (b).

13. A method for identifying a compound as a candidate for a herbicide, comprising:

- a) measuring the expression of a BS in a plant or plant cell in the absence of a compound;
- b) contacting a plant or plant cell with the compound and measuring the expression of the BS in the plant or plant cell;
- c) comparing the expression of BS in steps (a) and (b).

14. The method of claim 13 wherein the plant or plant cell is an *Arabidopsis* plant or plant cell.

15. The method of claim 14, wherein the BS is SEQ ID NO 2.

16. The method of claim 13, wherein the expression of BS is measured by detecting BS mRNA.

17. The method of claim 13, wherein the expression of BS is measured by detecting BS polypeptide.